NEURIPS 2026 · CREATIVE AI · SYDNEY

Draw This First

From prompts or pixels to replayable, language-directed vector drawings.

CREATE DERENDER DIRECT

Download offline deck ↓ Poster PDF ↓

Dazhi Zhong · Rowan Bradbury · Grant Davis

Krea.ai · Bradbury Group · Wand Technologies



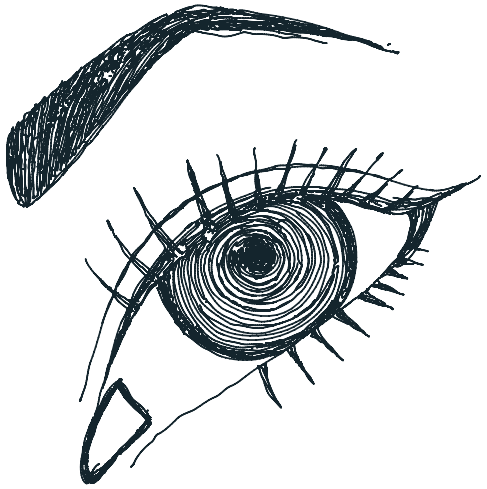
ONE ORDERED-VECTOR OUTPUT CONTRACT

Create. Derender. Direct.

New sketches and existing images become the same useful artifact: editable vectors with a process you can replay and control.

CREATE

final 50k · seed 0



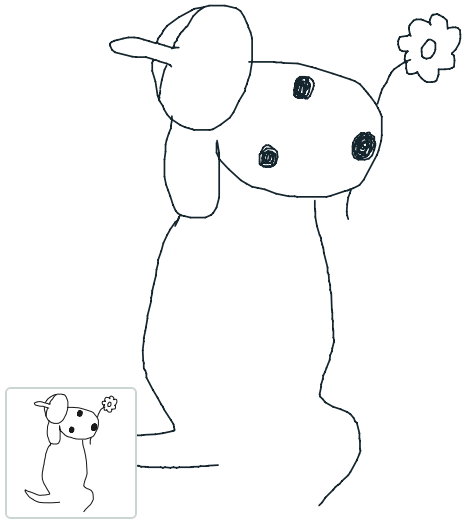
“eye”

Text becomes a new ordered vector sketch, retaining the image prior’s ability to invent a subject.

Play

DERENDER

Wand-HQ · final 50k



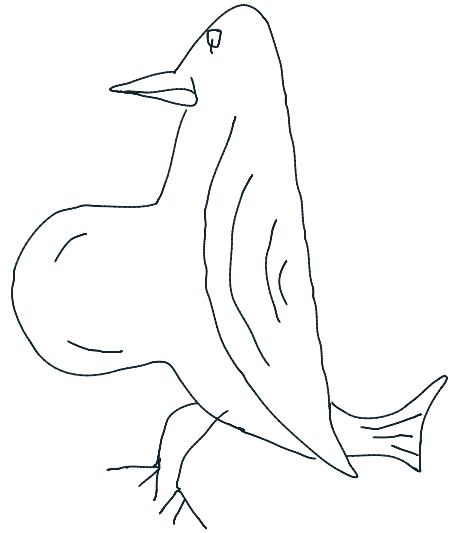
“First body, then head, then flower”

A raster sketch becomes editable paths and an inferred process—not just a traced outline.

Play

DIRECT

same input · same seed



Recorded | Reversed

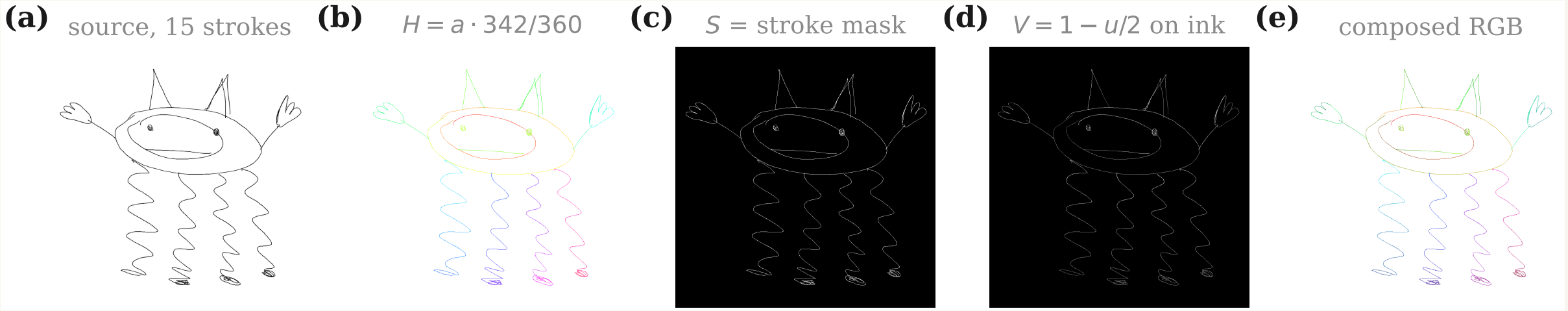
eye → beak → body → wings → tail → legs → details

Language changes the semantic drawing order while the measured geometry stays fixed.

Play

REPRESENTATION + ARTIST DATA

Order becomes an image-native field



Order as color

Global drawing progress becomes hue; progress within each stroke becomes value. A pretrained image model generates the whole field rather than emitting strokes one at a time.

47,318 drawings · 50 artists

Recorded vector sequences and hierarchical region/subject annotations ground the process in commissioned artistic work.

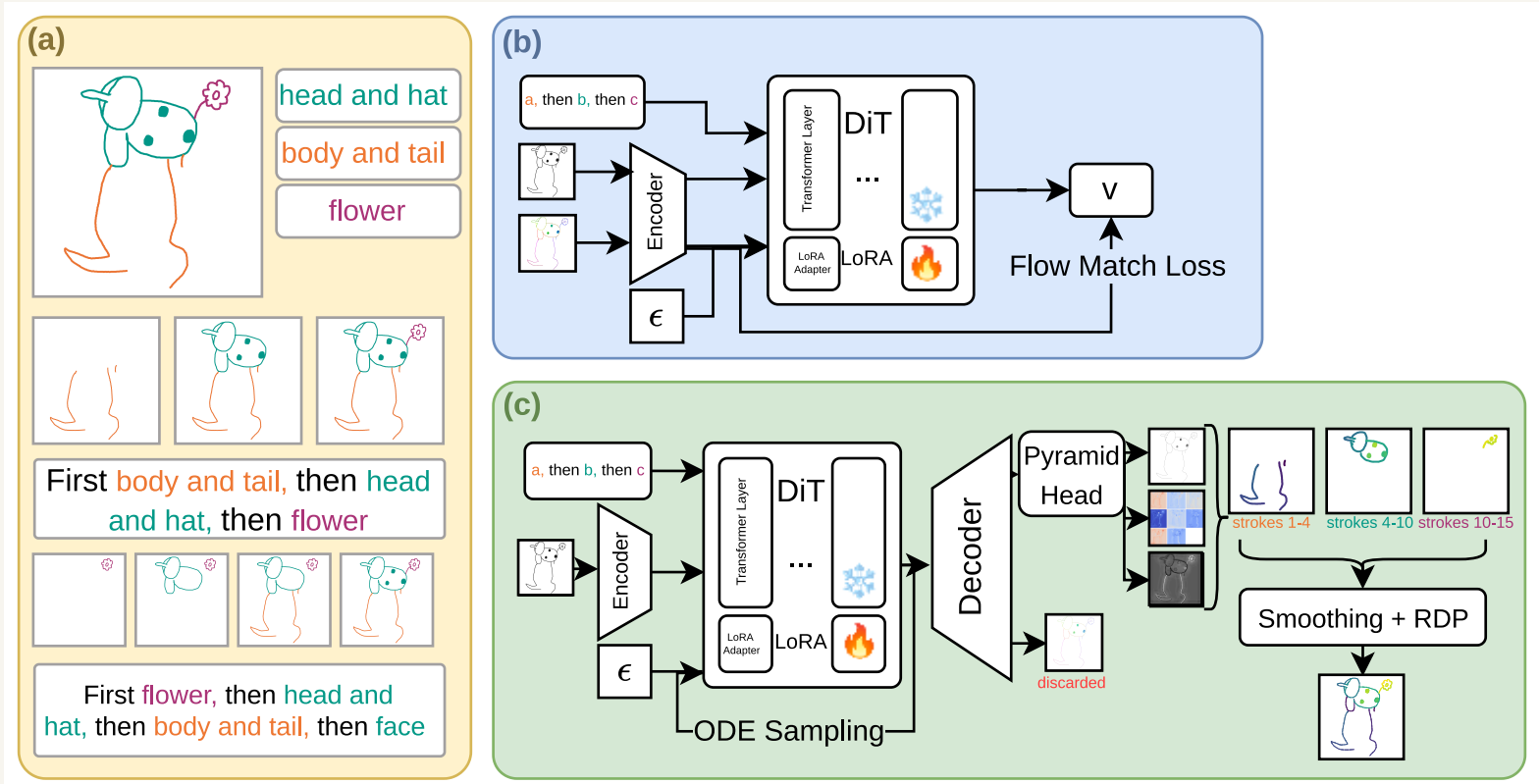
Order supervision by permutation

Reorder named regions and rewrite the caption to match, while preserving natural order inside each region.

Without a stroke log, the model infers a plausible or instructed process; it does not recover an original human one.

THE MECHANISM

Generate. Decode. Replay.



01 Generate

Qwen-Image-Edit + LoRA samples the codec image from text or an input sketch.

02 Decode

The order-native decoder predicts global arc, foreground, and stroke-instance embeddings.

03 Replay

Cluster, sort, smooth, and simplify into ordered vector polylines.

The useful output is not a raster animation. It is editable vector geometry whose sequence language can address.

THE CONTROLLED EXPERIMENT

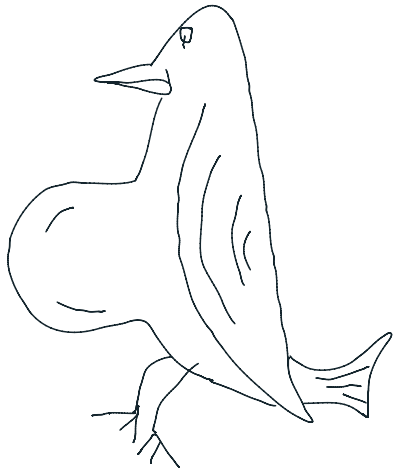
Language moves order, not geometry

Creative Birds + Creatures · fixed input and seed · 100 drawings per condition

RECORDED INSTRUCTION

example τ = +0.493

eye → beak → body → wings → tail → legs → details

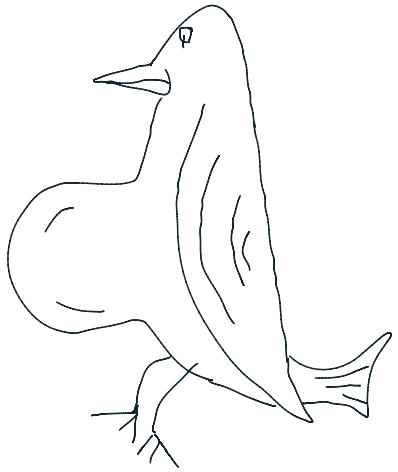


Play

REVERSED INSTRUCTION

example τ = −0.319

details → legs → tail → wings → body → beak → eye



Play

+0.373 → −0.267 aggregate matched Kendall τ

No caption: 0.139

Stroke match: 0.934 · Mask IoU: 0.601

τ compares produced and recorded order: positive follows, negative reverses, zero is unrelated. Example: birds_7509, selected by the paper's deterministic median rule.

CAPABILITIES + BOUNDARIES

A controllable process, with clear limits

0.838

Region-level instruction τ

The strongest control is between named semantic units.

0.75 / 0.84

QuickDraw Top-1 / Top-5

Fifty unseen categories test whether text-to-vector retains recognizable generation.

0.461 / 0.444

Part / pass instruction τ

Control weakens as instructions become finer and revisit more passes.

Process, not human imitation

Complex human drawings are not yet reproduced with fully human-like processes. Unrecorded processes are inferred, not recovered.

Vectorization remains lossy

Recovered paths fragment 1.7–2.5×. Local and within-unit order remain weaker than region-level control.

Order is only one channel

The representation drops timing, pressure, tilt, and brush width. Text-to-vector currently lags image derendering.

A unified, controllable interface—not a complete model of how humans draw.

DRAW THIS FIRST

An image model can generate the process—not only the picture.

Create a sketch. Derender a sketch. Direct the order.

> **Where this can lead**
>
> Turn abundant raster sketches into synthetic ordered-vector supervision for sketch-native generative models.
>
> **A bootstrap signal, not human-process ground truth.**

Dazhi Zhong · Rowan Bradbury · Grant Davis

elea@krea.ai

